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(54) APPARATUS FOR CONNECTING AND REMOVING A TEAT CUP CLUSTER OF A MILKING MACHINE TO AND FROM A COW RESPECTIVELY

(71) We, KUMMER ELECTRONICS B.V., a Dutch Company, of OOstergrachtswal 91-95, Leeuwarden, The Netherlands, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to an apparatus for connecting and removing a teat cup cluster of a milking machine to and from a cow respectively, said apparatus comprising a pneumatic piston-cylinder assembly operating by means of vacuum, as a lifting means which is adapted to be actuated by a valve in a communication conduit between said assembly and the vacuum conduit of the milking machine, said valve being in its turn adapted to be actuated by an electric switch in the piston-cylinder assembly, which switch is connected in an electronic control mechanism.

Such apparatus is known. Therein a diaphragm - operated switch is included in the suspension means for suspending the milking set to the piston and the diaphragm actuates the switch under the influence of the atmospheric pressure as soon as the diaphragm is relieved of the suspended weight by lifting the suspension means of the cluster. Then the switch closes the valve whereby the vacuum over the piston is cancelled and the piston with piston rod, suspension means for the milking set and the milking set itself start moving downwardly which may be promoted by pulling the suspension means in downward direction. Thereafter the teat cup cluster may be connected by means of the teat cups to the cow's udder. At the same time the electronic control mechanism has made the vacuum operative on the teat cups so that now the cow is being milked. If a milk indicator inserted in the connection between the milking set and the milking conduit of the machine signalizes a decrease of the milk flow to less than 0.2 liters per minute the vacuum is automatically switched off again. Also the valve in the piston-cylinder assembly is reopened by the electronic control mechanism whereby a vacuum is formed over the piston which assures the automatic lifting of the milking set towards the suspended position.

The diaphragm with the switch, e.g. a microswitch, are vulnerable and thereby susceptible to breakdown.

The invention aims at removing said disadvantage and providing an apparatus of the above-mentioned type which nevertheless is very easily actuatable, but cannot be made operative by accidental movements, e.g. of a cow.

This is obtained according to the invention in that the switch is an attitude sensitive switch, the piston-cylinder assembly being pivotally mounted in such manner that by pivoting the assembly to one or more predetermined pivoted attitudes the switch may be brought in an attitude in which it energizes the electronic control mechanism for closing the valve.

Thereby it is only necessary to pivot the piston-cylinder assembly into one of the predetermined attitudes in order to have the switch close the valve. This closed position is maintained by the control mechanism in spite of the fact that the piston-cylinder assembly returns to the vertical position after it is released, until the milk indicator signalizes such a decrease of the milk quantity that the milking should stop.

Usually there are a plurality of removing apparatus in a milking parlour, e.g. at both sides of a so-called pit, where there are standing places or stalls for a number of cows, each provided with a milking apparatus or set.

For easy actuation and at the same time in order to prevent that the switch could

be actuated by accidental movements of the cow, preferably the attitude sensitive switch is so mounted in the piston-cylinder assembly that it closes the valve when the removing apparatus is pivoted to an oblique position in a direction away from the stall for a cow associated with the relative apparatus.

In a milking parlour as mentioned above, having a pit, this is the attitude in which the milking apparatus is pivoted in the direction towards the pit.

As an example of an attitude sensitive switch a mercury switch may be mentioned. However, also other attitude sensitive switches may be used.

The invention is hereunder further described with reference to the accompanying drawings which show by way of example, an embodiment of teat cup cluster removing apparatus according to the invention. In the drawings:

Fig. 1 is a view looking on two standing places of a milking parlour, each provided with a removing apparatus, the left one being in the inoperative and the right one in the operative position; and

Fig. 2 is a side view as viewed from the right in Fig. 1.

In Fig. 1 two removing apparatus are shown, which are identical so that only one needs to be described.

The apparatus comprises a piston-cylinder assembly 1 in which a piston 2 with piston rod 3 are provided. The lower end of the piston rod has a suspension eye 4 from which a milking teat cup cluster 6 is suspended through the intermediary of a flexible cord 5. Said milking cluster has a central claw 7 with vacuum valve, to which four teat cups 9 are connected by means of hoses 8. At the same time a central milk hose 10 is connected to the housing 7. Said hose 10 leads to a stationary milk conduit 11 of the milking machine which conduit extends along all milking stalls in the parlour or other stationing position of the milking machine. Further a vacuum hose 12 is connected to the claw 7, said hose leading to a common vacuum conduit 13 from the pulsator of the milking machine. A milk indicator 14 is provided in the connecting hose 10. A vacuum communication 15 is provided between the cylinder 1, connected to a point above the piston 2, said communication leading to a second pipe 16 of the main vacuum conduit of the milking machine. At the position of the opening of the communication 15 in the cylinder 2 there is a valve 17, which has only been schematically indicated, said valve communicating or not communicating the vacuum with the chamber over the piston 2.

Now according to the invention at the position of the valve 17 or in another point in the cylinder 1 an attitude sensitive switch 18 is provided which is connected to the electronic control mechanism, whereby the switch 18 may open or close the valve 17. In the vertical position shown of the cylinder 1 the switch 18 keeps the valve 17 open, whereby vacuum is present over the piston 2 and the milking set is kept in the suspended or inoperative attitude as shown. If the piston-cylinder assembly 1, 2 is pivoted towards the viewer of Fig. 1, that is in the direction towards the pit of the milking parlour, around the suspension point 19, which may be an eye on the upper surface of the cylinder and a bracket mounted on the vacuum conduit 16, the switch 18 arrives in such an attitude that it closes the valve 17. Thereby the milking set 6 is lowered by its suspension means 4, 5 under the influence of gravity, if necessary promoted by pulling it downwardly, whereby the milking cluster may be connected to the cow's udder. Thereafter the vacuum in the hose 12 ensures that the cow is being milked.

When the quantity produced by the cow becomes less than 0.2 liters per minute, the milk indicator 14 issues a signal whereby the vacuum is closed from the housing 7 and at the same time the valve 17 is reopened. The vacuum in the teat holders 9 of the milking set is cancelled and is reinstituted in the chamber over the piston 2, whereby the milking set drops from the cow's udder and is automatically returned to the suspended position of the milking set by the vacuum present over the piston.

The oblique pivoted position of the piston-cylinder assembly is shown in Fig. 2 in broken lines. The teat cup cluster is in Fig. 2 in its suspended position, but also in its operative position after having been pivoted to the position shown in broken lines to actuate the switch, therefore corresponding to Fig. 1 right with the piston-cylinder assembly in the position shown in full lines in Fig. 2.

It appears from the drawing that the stalls for the cows are delimited by means of horizontal and vertical rods 20 and 21 respectively. The removing apparatus are preferably provided next to the pit in front of a horizontal rod 20, as viewed in Fig. 1, so that the apparatus cannot be made operative through casual movements of the cow since the presence of the pit and the rod 20 prevent this. Of course other dispositions are likewise possible.

The attitude sensitive switch 18 may be of an arbitrary type but a mercury switch is particularly suitable.

WHAT WE CLAIM IS:—

1. An apparatus for connecting and removing a teat cup cluster of a milking machine to and from a cow respectively, comprising a vacuum-operated pneumatic

piston-cylinder assembly operating as a lifting means for the teat cup cluster and which is adapted to be actuated by a valve in a communication conduit between said assembly and the vacuum conduit of the milking machine, said valve in its turn being adapted to be actuated by an attitude sensitive electric switch of the piston-cylinder assembly connected in an electronic control mechanism, the piston-cylinder assembly being pivotally mounted in such manner that by pivoting the assembly towards one or more predetermined pivoted attitudes the switch is brought into an attitude in which it energizes the electronic control mechanism for closing the valve.

2. Apparatus according to claim 1, wherein the attitude sensitive switch is so mounted in the piston-cylinder assembly that the valve is closed when the apparatus is pivoted to an oblique attitude away from the stall for a cow associated with the apparatus.

3. Apparatus according to claim 1 or 2, wherein the attitude sensitive switch is a mercury switch.

4. Apparatus according to any one of the preceding claims, wherein the piston-cylinder assembly is pivotally mounted about a suspension point adjacent the upper end of the cylinder, and the attitude sensitive switch is mounted at a position spaced from and below the suspension point.

5. An apparatus for connecting and removing a teat cup cluster of a milking machine to and from a cow respectively, constructed and arranged substantially as herein particularly described with reference to the accompanying drawings.

S. JONES-ROBINSON
Chartered Patent Agent,
The Laurels, 320 London Road,
Charlton Kings, Cheltenham,
Gloucestershire GL52 6YJ.

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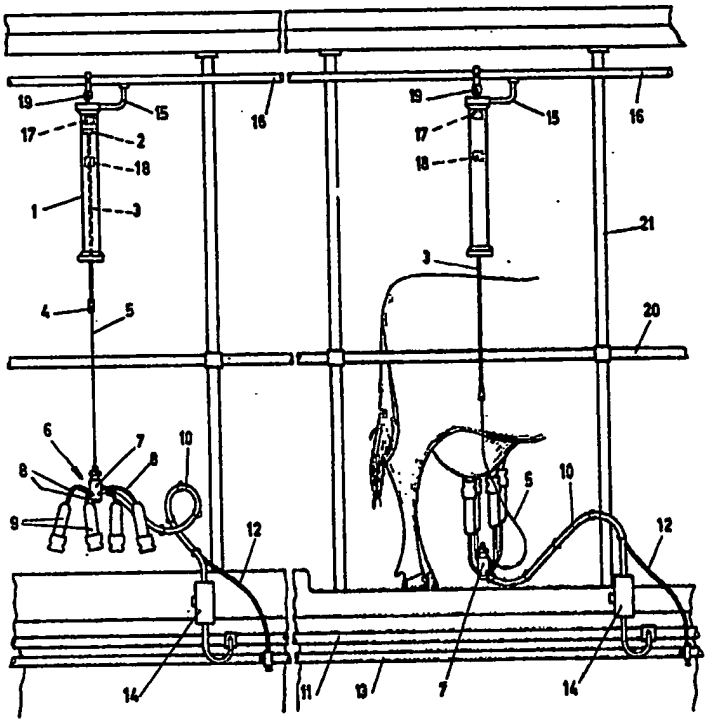
Sheet 1

FIG. 1



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Sheet 2

FIG. 2